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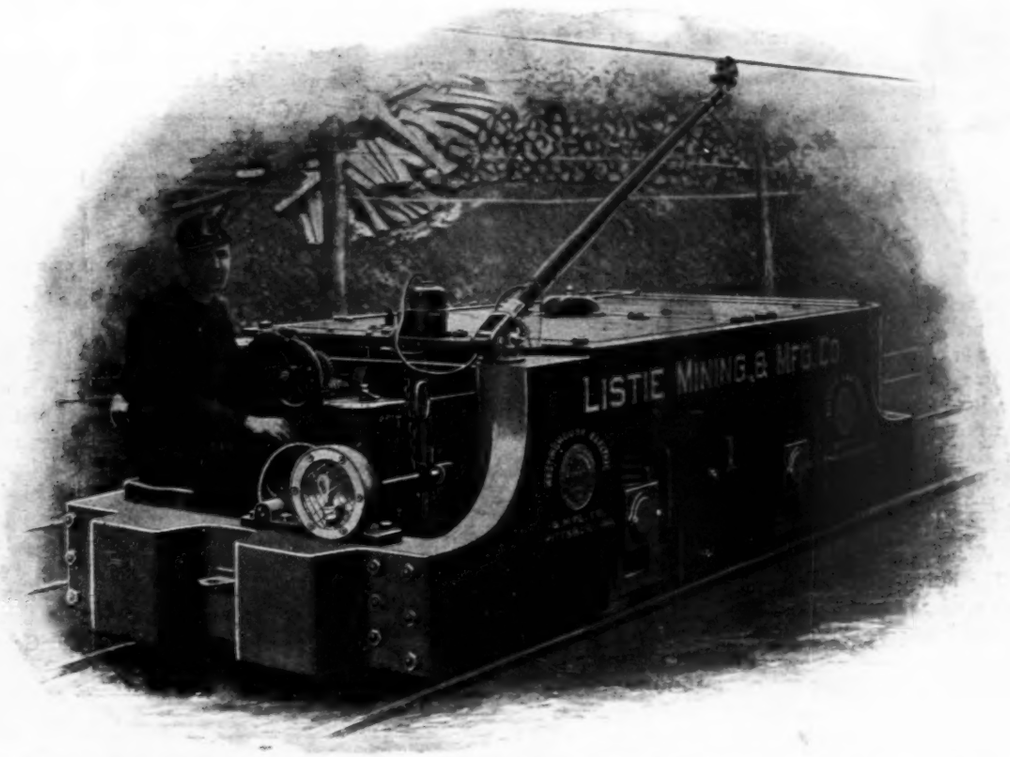
POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

TELLS YOU HOW TO DO THINGS. WRITTEN SO YOU CAN UNDERSTAND IT

Vol. II. No. 1. CHICAGO, JULY 5, 1902. PRICE 5 CENTS.

Now Coal Mines Have Trolley Cars



Electric Locomotive that Hauls 500 Tons at One Time

IN THIS ISSUE:

America Is Invincible.
To Reclaim Babylon by Colorado Method.
Offered Ten Million Dollars for an Invention.
To Telephone Across the Ocean.
Making Pine Needle Oil.
Two Processes of Electric Welding.
Home Made Xylophone.
Method of Firing Soft Coal Without Smoke.
How to Make a Telephone—Part III.
Queerest Vessels Afloat.
Big Electric Plant for Wales.
Shop Notes:—New Solder for Aluminum—Tandem-Compound Using Superheated Steam—Strength of Steam Pipe—Tempering Rock Drills with Coal Oil—Origin of the Lathe—Furnace Arch Bars.
Summer Course in Easy Mechanics for Boys. Chap. II.
Pocket Life Saver.
Story:—The Drive Wheel That Ran Away.

FOR SALE BY ALL NEWSDEALERS.

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SMITHSONIAN DEPOSIT

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ELECTRIC MINE LOCOMOTIVE.

Electricity has driven the mule from our street cars and is rapidly displacing him for hauling the thousands of cars used in coal mines. In many places the underground tunnels radiate thousands of feet from the bottom of the shaft; the cars are like an army of ants, which go out in every direction and bring back their load to one central point. For this work a very different kind of electric car is built from that we see carrying passengers on the streets. The motor cars must be made very low. They use a trolley and the motorman sits on a little seat in front. As the car passes along the tunnels it picks up the loaded cars from the galleries and rooms, and gathers up a long train. The motor never balks and does not rebel at heavy loads.

Rails are used, weighing 30 pounds to the yard, and the motor weighs from 10 to 13 tons, and will climb a 3 per cent grade.

In one Pennsylvania mine there are 32 of these electric locomotives which run on a regular schedule like a steam railroad. Each locomotive makes 11 trips per day, hauling 500 tons at each trip. It cost the company 10 cents a ton to do this hauling with mules; electricity does the work for 1 cent per ton. In this mine the average haul is one mile. The motor runs 8 miles an hour.

We illustrate one of these electric locomotives which was built by the Westinghouse Electric Co., Pittsburg.

KILLED BY HIS OWN INVENTION.

Herman O. Moritz, a Brooklyn inventor, 62 years old, was killed at Coney Island by a device on the invention of which he had spent more than a quarter of a century and all his savings. Moritz's invention was an aerial toboggan slide. Permission had just been granted to operate it. The device seemed to be working to perfection, and as the cars went down the steep slide and came up with a round turn Moritz looked on. He shouted for joy. The dream of the last twenty-five years of his life was realized.

Inspector Rittenhouse and Charles Otis, a friend of the inventor, rode in the last car to be tested. Moritz stood at the foot of the incline. The car had nearly reached the top, a distance of seventy feet, when it shot backward. It came down with great velocity straight for the place where Moritz was standing. The heavy vehicle struck him in the back, knocking him through a wire netting and out into the Bowery walk. He died two hours later. Rittenhouse and Otis were uninjured.

TO RECLAIM BABYLON BY COLORADO METHOD.

Baron von Oppenheim, commissioner from Germany to investigate western irrigation, has completed a tour of northern Colorado and is enthusiastic over the application of water from the mountains and the results derived. He proposes to adopt the same form of storing storm water for the reclamation of the valley of Babylon, which is largely owned by German capitalists along the line of a railroad under construction from Constantinople through Bagdad to the Persian gulf. Upon the site of Babylon there is now being built a small city which will be touched by the railroad, and Baron von Oppenheim believes that once the water is stored and again turned into the canals the land will become productive and resume its former prosperity.

"Molascuit" is the name of a new cattle food manufactured in the West Indies. It is made from molasses and cush-cush of bagasse, the finest part of the fiber of sugar cane. It contains 50 per cent of nutrition and is said to be the finest food of the kind yet discovered.

A pumping engine in a Birmingham canal station has been removed after having been in continuous use for 120 years.

KISSING BARRED ON THE PENNSYLVANIA.

Authorities of Chicago Will Refuse to Enforce the Order if Extended to this City.

Kissing has been prohibited at the Jersey City station of the Pennsylvania railroad. The order is issued by P. P. A. Abercrombie, eastern superintendent of the Pennsylvania lines, who denounces kissing in public as an obnoxious nuisance. The rule will probably be extended to all the stations of the system and other roads are talking of following the Pennsylvania's example. This is the notice that has been posted in the Pennsylvania station at Jersey City by order of Superintendent Abercrombie:

"All trainmen, gatemen, and ticket examiners will stop all persons from exchanging kisses upon the arrival and departure of trains in this station. This order must be rigidly enforced."

Corporation Counsel Walker of Chicago says that if the order is extended to Chicago it shall not be enforced. He said:

"I'd like to see somebody stop me from kissing my wife at a railway station. If you want to kiss a woman, and you have a right to—which means, according to the courts that neither of you object—nobody can prevent you. If somebody does, in a railway station or in any other place, he is guilty of assault. The order is without legal value."

AMERICA IS INVINCIBLE.

The Outer World Has No Conception of Her Greatness.

By Privy Counselor Goldberger, sent by the German Government to Investigate United States Commerce.

God has blessed the country so surpassingly with the elements of greatness that the world faces in the United States an almost invincible combination. I can only speak in superlatives of the men and resources of America. Europe is wholly without adequate conception of them and discusses them with knowledge similar to that with which humanity treats of the life hereafter.

When I saw how lavishly Providence has sown the soil of America with gold, silver, iron, copper, petroleum, grain, cotton and timber and planted above them a race of industrial giants I began to realize how impregnably America is intrenched against attack. Any reaction in that land can only be temporary. The geniuses who steer its commercial ship can weather the worst storms. Germany seemed everywhere to be warmly regarded. The two countries are certain to meet on the battlefield of trade, but as friends. If I were a younger man Germany would be too small for me.

BRITISHERS HAVE TROUBLE WITH CELLULOID.

Collars Burn Their Necks, Organ Explodes, Combs Catch Fire and Many Are Injured.

Britishers are experiencing great troubles from American celluloid and there is talk of suppressing its usage. The London Lancet in reviewing the disasters says:

"A man while smoking a cigar was playing an American organ with celluloid keys. Some red hot ashes dropped on the keys and they burst into flames, which were extinguished with difficulty. A boy was wearing a celluloid collar tied with a string. To remove the collar he burned the string. The collar ignited and lighted drops of the composition fell on his clothing. His throat and face were badly burned. A woman, seated before a fire which was not unusually strong, found her hair enveloped in smoke and flame from ignition of the comb. Before the flames could be extinguished an area of the scalp 4 by 1½ inches was destroyed. The burn was of the third degree, and the hair of the injured area was permanently destroyed. It is urged that government should interfere."

MORE SUFFERING FOR THE POOR AUTOMOBOLIST.

Automobile earache, causing most intense pain, is the latest ailment to afflict the unfortunate possessors of racing autos, against which man and nature seem to have inaugurated a relentless war. The set jaws, glaring eyes and strained expression that make hideous those afflicted with the "automobile face," is not enough of physical punishment to inflict on these persecuted automobilists. Now they must suffer with the "auto ear," besides undergoing the ignominy of being chased by "sparrow cops," run in by the boulevard police, fined, lectured and censured by the stern police court magistrate and menaced by the small boy. Several cases of the auto ear have appeared in New York and Chicago. Physicians treating them aver that rapid automobiling is the cause of the trouble. It is caused by the action of the wind resulting from the terrific speed. A Society for Lightening the Burdens of Chauffeurs is in order.

OFFERED $10,000,000 FOR AN INVENTION.

To Lessen Cost of Making Glass by Doing Away With Blowers.

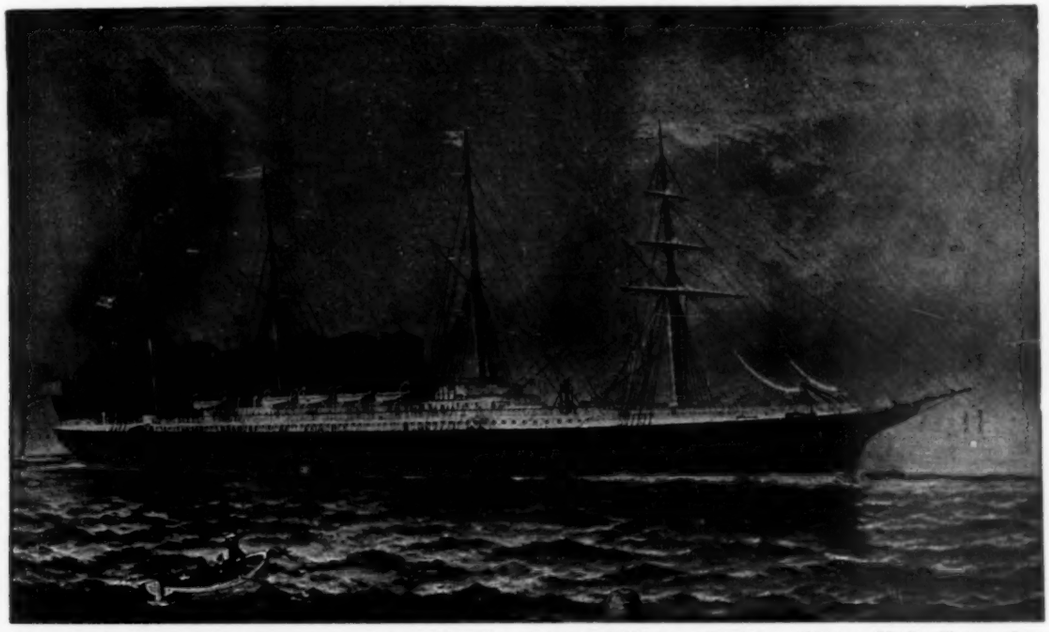
The American Window Glass Company has begun the exploitation of an invention for which $10,000,000 has been offered, and which is expected to decrease the cost of the production of glass by doing away with blower, gatherers, and snappers, all of whom are high-priced men. Twelve machines designed by John Lubbers have been installed in the old De Pauw plant at Alexandria, Ind., which has been newly equipped throughout for the production of glass.

For nearly a year three of the machines have been secretly operated here and all imperfections and drawbacks encountered at first have been overcome, it is said. Should the operation of the machines be as successful at De Pauw as they have been here the window glass company will immediately equip its factories throughout the country with them, and a vast number of skilled workmen will be without occupations.

The patents on the machines are owned by Lubbers and four officials of the window glass company, one of whom is President James A. Chambers, who announced today that $10,000,000 had been offered for them. It is proposed to operate them on a royalty system.

THE PICTURESQUE STEAMSHIP, CITY OF ROME.

From an artistic point of view the steamship City of Rome of the Anchor Line, is regarded by many as the handsomest vessel afloat. Her four great steel pole masts and three funnels are conspicuous from afar and as she draws near her net work of ropes and lines above deck add to the picturesqueness of her appearance. The boat is equipped with a very thorough and complete system of natural and mechanical ventilation.



The Anchor Line's Single-Screw Iron Steamship City of Rome, 8,415 Tons Register.—Courtesy Marine Engineering.

The City of Rome is an iron steamship of 8,415 tons register. The Anchor Line's new steel twin-screw steamer Columbia has been placed in service between New York and Glascow. She is a magnificent boat and has a gross tonnage of 8,400. When loaded her displacement is 15,000 tons. She is 500 feet over all, 56 feet moulded breath and 36 feet deep.

TO TELEPHONE ACROSS THE OCEAN.

Telegraph Companies the Most Inert Organizations on Earth, Says Prof. Pupin.

Talking by telephone between New York and San Francisco, and even between New York and London, may soon become as common as ordinary telephonic conversation between two parts of a city. These things, it is claimed, will be made possible through induction coils invented by Prof. Michael I. Pupin of Columbia University. Prof. Pupin says that the principal value of wireless telegraphy will always be for communication with vessels at sea and not for long distance messages between fixed stations. He declared that the Western Uuion and the Postal Telegraph companies were two of the most inert organizations in the world.

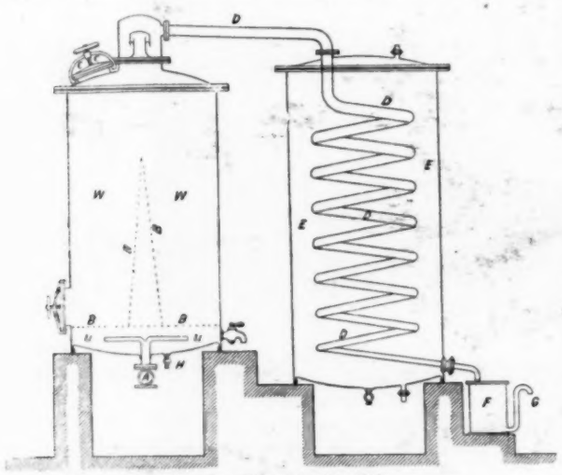
"No effort will be made to establish an ocean telephone system," said the professor, "until the land work has been thoroughly tried. Wireless messages can never compete with the cables, if the cables are developed to their highest efficiency. The cables certainly are not so developed today. Wireless messages can never be sent at great distances on land. The land is a poor conductor. The Western Union and Postal companies are both using antiquated methods. The Western Union company does not spend 10 cents a year for experiments, as far as I can learn."

MAKING PINE NEEDLE OIL.

Interesting Process Used in Germany—Oil Used for Rheumatism.

The manufacture of the pungent oil contained in pine needles is quite an industry in Germany. Little has been known about the process here, until U. S. Consul Hughes, at Coburg, succeeded in getting some facts which have been carefully guarded.

The pine needles are gathered in May and June and cut into



Machine for Pine Needle Oil.

small pieces. They are then put into the cylinder shown in the cut, at C, and steam let in at A. The dotted lines at B forming a cone is made of perforated zinc, through which the steam penetrates the mass. The steam carries the oil through the pipe D into the serpent-coil or still, and the condensed water runs out into the tank F, where the oil is drawn off and the water flows out at G.

The needles are taken out and dried and used to make pillows and mattresses.

AN ENGLISH ADVERTISEMENT.

An English maker of rubber tires for automobiles used this

Rubber Tire Ad.

illustration to show the difference between his tires and those made by others.

A school where farming is to be taught in practice as well as in theory has been established at Poughkeepsie, New York. Five hundred acres of land have been purchased for the purpose and the farm is to be equipped with all the very latest agricultural implements. It is to be known as the School of Practical Agriculture. Prof. George T. Powell, a recognized authority on scientific agriculture is at the head of the institution. Abraham S. Hewitt and R. Fulton Cutting, all of New York, are among the organizers.

SECRET OF THE MOTOR MAY BE SOLVED.

Spanish Inventor Generates Electricity Without Use of Intermediate Agency.

An electric motor operated solely by force generated from the atmosphere is said to have been invented by Senor Clemente Figueras of Las Palmas, Canary Islands. If this report be true, as the London Daily Mail says it is, the secret of the motor is solved. His secret of generating electricity without the use of an intermediate motive power or chemical action, Clemente has guarded carefully, says the Mail's correspondent. The only extraordinary point about it, he declares, is that it has taken so long to discover a simple scientific fact. Senor Figueras is engineer of woods and forests for the Canary Islands and for many years was professor of physics for St. Augustine College, Las Palmas. He now has one of the machines in successful operation. With a rough apparatus, he has constructed, he obtains a current of 550 volts, which he uses in lighting his house and driving a 20 horse-power motor. He will go to London soon with a perfected working apparatus. At present Figueras will not give out any information regarding the device further than that he has invented a generator which can collect the electric fluid, that he is able to store it and can apply it to an infinite number of purposes, for instance in connection with ship railways and manufactories. He had his machine made in separate parts in Paris, Berlin and Las Palmas, and fitted them together himself. The firm in Berlin, which supplied some of the parts was curious enough to send to the Canary Islands an emissary to try to draw information from the professor, but the attempt was unsuccessful. A German electrical company is reported to have offered a large sum for the invention, while a syndicate in Barcelona has also made a generous offer. Neither advance has been accepted.

TWO PROCESSES OF ELECTRIC WELDING.

Chief Cost of the System is Obtaining the Power to Produce Necessary Heat.

There are two systems of electric welding, the Bernados and Elihu Thompson systems. The former is by the direct action of the electric arc. In describing this process Mr. T. T. Eaton says: The current flows from the dynamo to the metal to be welded; from the metal to be welded to a carbon; from this carbon, through a resistance regulator for adjusting the amount of current required, and back to the dynamo. When the carbon is placed in contact with the work the current passes. By withdrawing the carbon a short distance, an electric arc is produced which may be from ¾ inch to 1½ inches or more in length. By withdrawing the carbon altogether from the work the current is made to cease. The work thus forms one pole of the arc and the carbon the other. The work may be made to form part of the welding circuit by various means according to circumstances, and the carbon may be mixed in a machine for special purposes or as is generally the case in suitable insulated holder held in the hand of the operator.

The system invented by Elihu Thompson consists of placing the pieces to be welded in contact, forcing through the metal to be heated very large quantities of electric current and as soon as the welding heat is attained, strong pressure, mechanically applied, forces the pieces together and completes the weld, which may be hammered or not as may be desired.

The Bernadoes process has generally been found the better from a practical and economical standpoint. The chief cost in electric welding is not the labor involved, but the power required for produing the necessary heat.

The production of coal in the United States last year amounted to 292,240,758 tons, valued at $348,813,831. This is an increase of 22,358,931 tons and $41,922,467 over the preceding year.

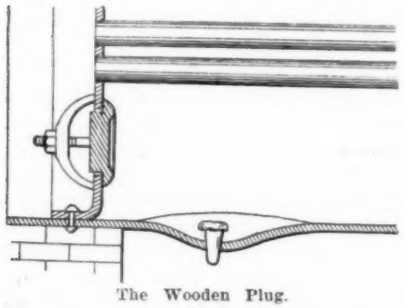
MOTOR FISHING BOATS IN DEMAND.

The introduction of motor boats for commercial purposes promises to revolutionize the extensive fishing interests of eastern Long Island. The days of the uncertain and often becalmed sailing sloop are numbered, for the fishing season is now in full blast again and nearly all the boats are equipped with electric or gasoline motors.

The fishermen now will have regular schedules on which they will conduct their business, says the Fishing Gazette. The pounds will be raised to the surface, and in two hours, at stated periods, the fish will be iced away in boxes, transported by the "motor" to the railroad at Promised Land or Montauk, and will be hurried toward the city market, where they arrive in short order to be sold in less than twenty-four hours from the time they were swimming in the bay at Montauk.

AN EXTRAORDINARY REPAIR.

A writer in The Engineer tells of a visit to a plant which had seen better days, but had suffered from the management of cheap and ignorant men. Lying at one side of the building was a boiler plate with a bag as large as they make 'em; another thing, the bag had a hole in it. Upon inquiry it was ascertained that the plate was ruined by the accumulation of scales, and



The Wooden Plug.

then came the old, old story of a burnt plate resulting in a bag. The bag was allowed to go on getting larger and larger, until finally it began to sweat, and a hole was made in it as the result of a hammer stroke. The informant stated that for three nights the boiler had been operated with a wooden plug driven through the hole, as shown in the cut, after which time the plate was replaced by a new one.

OFF FOR ARCTIC SEAS.

W. S. Champ, secretary of the Baldwin-Ziegler arctic expedition, and Dr. G. Shurkley proceeded from Tromsoe, Norway, whence they sailed on July 1 on the Frithjof for Franz Josef Land to take coal to Mr. Baldwin's ship, the America, and obtain news of the arctic explorer.

Mr. Champ expects to find the America in about 82 degrees. If Mr. Baldwin has succeeded in his dash to the pole he will be brought back. Otherwise the Frithjof will leave a well-equipped sled party to search for Mr. Baldwin. The Frithjof will return on Oct. 1 at the latest.

The Baldwin-Ziegler arctic expedition, consisting of the America and Belgica, left Tromsoe, Norway, on July 16, 1901.

A HOME-MADE XYLOPHONE.

The principal materials required for the home construction of a xylophone are a common but clean cigar box and faith in your own ability. Insert little tacks in both length sides of the box at even distances, says Presto. Span thin wire from tack to tack across the top of the box and push a sharp-cornered, smooth piece of wood under the wires to the left of the top. To get the correct scale push small squares of wood under each wire and move them to and fro until the harmony is reached, then take two stiff staffs of wood with a cork on one end of each of them and after a little practice you can show satisfactory results.

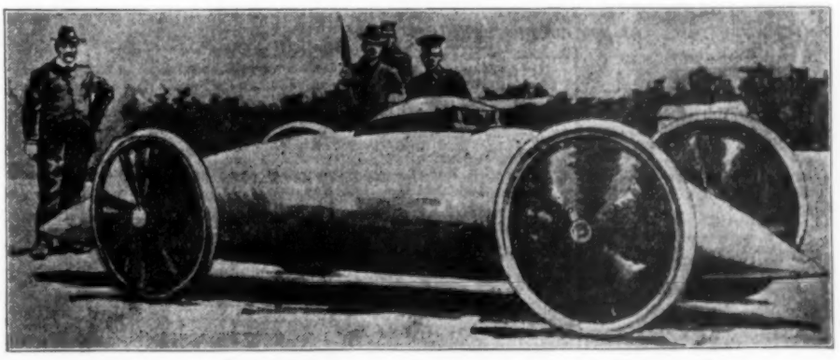
ADOPT YANKEE INVENTIONS.

The American telegraph system invented by the late Prof. Rowland has been installed in the German empire, and Italy and France and Russia are negotiating for it. In Germany the system has been attached to the lines which connect Berlin, Hamburg and Frankfort-on-Main for the purpose of facilitating the bourse traffic. It will ultimately be extended throughout the empire. The Rowland instruments are said to increase the capacity of the existing lines eight fold, making it possible to transmit eight messages simultaneously over a single wire.

The postoffice authorities in Germany have adopted the American electric mail marker. The weather bureau and the war and navy departments have installed outfits of American duplicating machines.

AUTOMOBILE THAT RAN AMUCK, KILLING AND INJURING.

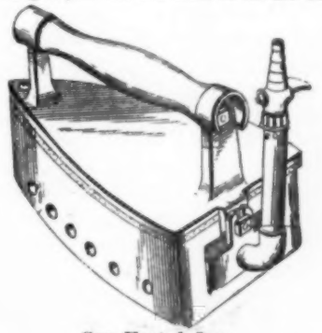
This is the machine which broke away from the control of its drivers at Staten Island and tore through the crowd of spectators, killing one and injuring more or less severely eighteen. The machine was making a mile a minute when it plunged into the wall of onlookers. The automobile is one of the strangest appearing devices that has yet made its appearance. It is built cigar shaped so as to afford the least possible resistance to the atmosphere.



The Machine Which Ran Away.

GAS HEATED IRON.

This iron is intended to be heated with ordinary gas such as is used to light a house. It is connected by a rubber tube of whatever length is necessary to the nearest gas jet. In the iron is an air mixer



Gas Heated Iron.

and a deflector throws the heat downward to heat the face of the iron. The degree of heat is regulated by a cock. The iron may be used continuously for hours and no time lost in changing cold irons for hot. The heating of the room in summer is also avoided.

KEEP A MOVING.

In the busy helter-skelter of this hurly-burly world,
The drone is often crowded to the wall,
But it is our hurry-scurry and our get-there-Eli way,
That makes this life worth living, after all.
—Four-Track News for June.

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A METHOD OF FIRING SOFT COAL WITHOUT SMOKE.

I never read or see a discussion of the smoke abatement question without thinking of a method which was shown me several years ago, writes Wm. Kavanagh in June Power.

A man called at the engine room and said that he would burn soft coal without smoke and make no changes or alterations to the furnace, it being necessary only for me to give him the permission to go ahead, which was done with the understanding that the continuous operation of the plant must not be endangered.

The boilers were of the horizontal tubular type with the usual brick setting. The grates were composed of plain, straight bars made to burn pea coal. The next day my visitor arrived with a load of soft coal, together with a load of hard coal dust, and gave instructions to keep them entirely separate. The time for starting the engine was 7 o'clock a. m., and as this method requires considerable time before steam begins to form, it was necessary to begin about 3 o'clock. He began by cleaning the furnace thoroughly of ashes, then placed a layer of soft coal lumps on the grate bars; on top of this layer was placed some wood. The fire was started, and when the wood was well lighted, he placed a layer of soft coal lumps on top, and waited until the fire made its appearance through this, when he again covered it with soft coal lumps. After the third layer of soft coal was properly spread, he took a hose and sprayed a fine shower of water all over the coal, closed the furnace door and opened the draft wide. In this way he built what he called the bed. After the bed was formed, he took some hard coal dust, wetting it to about the consistency of mortar and placed a layer of this on top of his soft coal bed. This was spread over, and when fire made its appearance through it, covered it with another layer of soft coal and then added a top layer of hard coal dust.

It was now time to blow the whistle and start the engine, and the pressure was sufficient for all purposes. In anticipation of trouble, I had another boiler ready with steam up, but it was not required, as we ran along very nicely all day. The firing was practically over at 8 o'clock a. m., no more coal being used with the exception of a few shovelfuls of hard coal dust to stop air holes whenever they made their appearance. After 8 o'clock he washed up, took a chair and made himself comfortable for the remainder of the day. There was no trouble in keeping steam, no smoke, and at night when the fire was banked it was surprising to see how the whole mass of coal was consumed, leaving hardly any ashes and no clinkers. Occasionally during the day the fire was sprayed with water. To bank, it was only necessary to push back what was left, which had the appearance of a large honeycomb. In the morning the fire was spread and the same routine followed. After running a few days with this method of soft coal burning, the writer was asked to make a test for evaporation, which resulted as follows: Duration of test, 10 hours; soft coal burned, 1,600 pounds; hard coal dust burned, 2,000 pounds; total fuel, 3,600 pounds; amount of water evaporated, 26,400 pounds; evaporation per pound of mixture, 7.33 pounds; cost of mixture, $3.90. Under similar conditions, a test was made with pea coal with the following results: Coal burned, 2,800 pounds; water evaporated, 25,600 pounds; water evaporated per pound of pea coal, 9.15 pounds; cost of pea coal, $4.20.

At first sight this would appear to indicate an advantage for the mixture, but when the extra amount of labor required to handle the coals separately and wet them, not to mention the extra hours, it will be seen that the test was really in favor of the pea coal.

John Bull: Here's your new play-ground, boys; it has cost me a pretty penny; make the most of it.—British Advertiser.

LAW POINTS FOR EMPLOYER AND EMPLOYED.

(Carefully compiled From the Latest Decisions.)

An employer owes a positive duty to his workmen to use ordinary care to furnish appliances reasonably safe for their use considering the nature of the service, and to provide a safe place to work, and keep it in suitable condition. Where he delegates such duty to another, he is responsible for its proper performance by such other, although the latter may be, as to other matters, a fellow-servant with other employes, for whose negligence the employer is not responsible to them. (108 Fed. Rep., 335.)

Popular Mechanics is "written so you can understand it."

PORTABLE SEAT.

This is the invention of an Indiana man who must have been thinking of messenger boys and strap holders in street cars. The seat folds up into small compass when not in use and is quickly adjusted when needed.

Messenger's Delight.

A MULTIPLICATION-ADDITION TABLE.

The following table was worked out by a Harvard professor. It is interesting to look at, but one is thankful that it is not included among the multiplication tables:

1 time 9 plus 2 equals 11.
12 times 9 plus 3 equals 111
123 times 9 plus 4 equals 1111.
1234 times 9 plus 5 equals 11111.
12345 times 9 plus 6 equals 111111
123456 times 9 plus 7 equals 1111111.
1234567 times 9 plus 8 equals 11111111.
12345678 times 9 plus 9 equals 111111111.
1 time 8 plus 1 equals 9.
12 times 8 plus 2 equals 98.
123 times 8 plus 3 equals 987.
1234 times 8 plus 4 equals 9876.
12345 times 8 plus 5 equals 98765.
123456 times 8 plus 6 equals 987654.
1234567 times 8 plus 7 equals 9876543.
12345678 times 8 plus 8 equals 98765432.
123456789 times 8 plus 9 equals 987654321.

DENOUNCES THE RICH OF DENVER.

At the graduating exercises of Denver University John W. Springer, a millionaire cattleman from Jacksonville, Ill., created a sensation by addressing the students as follows:

"Go home and tell your father and mother that you have been favored with an education that any man might be proud of. Tell the people of the state that Denver's wealth has never built a public library, never given a permanent home to orphan children, and never paid the debts on the magnificent temples of worship built all over this, the most beautiful city in the American union today.

"You can appeal to the wealth of Denver until you grow black in the face for an auditorium, for monuments, museums, art galleries, and all you will get will be an allopathic dose of ennui. What Denver needs is the administration of heart salve, which would draw the bands of penuriousness from around dwarfed hearts."

SOCIETY WOMEN MAKE CALLS BY TELEPHONE.

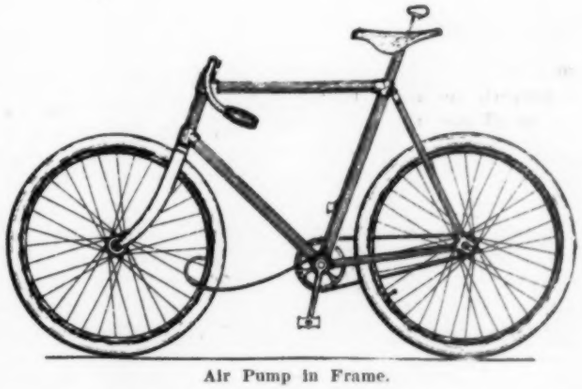
Making calls by telephone is the latest thing in absolutely correct social circles in Evanston, the classic suburb of Chicago. The new and convenient social custom is an outgrowth of the practice that has for some time been prevalent among club women of transacting club business over the wire.

So much easier was it found to thus pay social obligations, arrayed in a comfortable morning gown and slippers, without stirring outside the house, that the new custom has come rapidly into vogue and is now firmly established.

Not only the telephonic calling method saves much time, but it enables the women to really become better acquainted than under the old calling system, since it is now a regular part of the daily routine of Evanston society women to call up half a dozen friends each morning merely to have a little chat with each one about things in general. During the few weeks that have elapsed since the practice became a part of the social code a larger number of telephones have been installed in private houses than in any previous period of equal length in Evanston's history.

ALWAYS THERE BICYCLE PUMP.

Eugene F. Smith of Stockton, Cal., when on a long distance ride had a tire flatten out on him. He had left his pump at home and had to push his wheel four miles before he could inflate again. Now he has a pump which is a part of the machine. He put a piston in one of the tubes of the frame and the pump is always there when wanted.



Air Pump in Frame.

CHILD'S PERAMBULATOR.

This device is wheeled upon two wheels and protects the child from wind and sun. It is pushed by a handle which may be raised to a vertical position and fastened so as to permit the perambulator to be carried, like a market basket, over rough places.

Baby Perambulator.

THE NEW RIVER STEAMER ST. LOUIS.

The new steel hull built for the Annie Russell of St. Louis was recently launched at Dubuque. The launching was witnessed by a large number of people, among whom was the owner of the boat, Commodore Gardner.

The boat is 120 feet long, 25 feet wide and 4½ feet deep from deck to bottom, marked to draw 3 feet. It has nine watertight compartments, the first Mississippi river boat so equipped, which will afford absolute safety from sinking.

In Japan every child is taught to write with both hands.

Easy Electrical Experiments FOR BOYS

By L. P. Dickinson

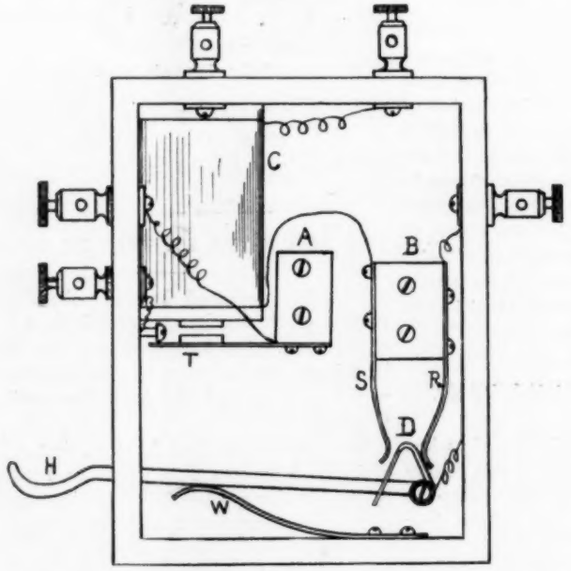
CHAPTER XXVI.

HOW TO MAKE A TELEPHONE—PART III.

In addition to a transmitter and a receiver, we need some form of apparatus by means of which either party can call up the other. The ordinary form of electric bell with push button is hardly sensitive enough, unless the line be very short, and the battery used very powerful. We need too, some simple device for cutting the battery out of service when the instrument is not in use, and for cutting the ringing device into service when desired. The apparatus to be described accomplishes these purposes, and is not difficult to make.

Make a wooden box which is 6 inches wide, 8 inches long, and 4 inches deep, measurements being taken on the inside of the box. It should be provided with a cover which may be fastened on by screws. The material used is ½ inch in thickness.

Take a piece of brass or copper rod ¼ inch in diameter, and



about 8½ inches long. Bend one end into the form of a hook as shown at H. Take a piece of thin sheet copper or brass about 2½ inches long and ⅝ inches wide. Bend this into the form of a V as shown at D. One arm should be about 1 inch long, and the other arm should be bent on the end so as to form a circular bearing which will just fit nicely on a 1-inch brass screw. This piece of brass is to be fastened to the end of the brass hook just constructed.

Bore a hole through the straight arm of the piece D, push the end of the brass rod through it until its end rests against the circular bearing, and solder the whole firmly together. The brass hook is then to be mounted by means of a 1-inch screw to the back of the box, on the inside, the screw being 1 inch from the lower corner of the box. The curved end of the hook projects through a slot cut in the side of the box, of such a width that the hook may move freely up and down through a slot cut in the side of the box, of such a width that the hook may move freely up and down through a distance of about one inch.

The spring W is easily made from an old piece of clock spring. and pushes up on the hook with considerable force. The springs S and R are made of quite thin brass. The spring R makes contact with D when the hook is up, and S makes contact with D when the hook is down. When D is in contact with one spring, it must not make contact with the other. They are supported by the block of wood B. Be careful that the screws which hold one spring do not touch the screws which hold the other.

At C is shown a coil of wire. Procure a piece of soft iron rod 4⅛ inches long, and ⅝ inch in diameter. Mount tightly upon each end a circular piece of wood ¼ inch thick, and 2 inches square. Wind the iron rod between the pieces with a layer of heavy paper, and then wind the entire space full of No. 30 double silk covered magnet wire. About four ounces will be required. Then fasten the coil in its place in the upper left hand corner of the box.

The spring T should be as thin and flexible as it can be made. Very thin copper or brass will answer. It carries at its outer end a small piece of iron, which serves as an armature, being attracted towards the coil whenever a current goes through the latter. The spring should be long enough so that its end will touch a brass screw inserted in the side of the box, when the armature is attracted towards the coil. When the armature moves away from the coil, the spring should not touch the brass screw just mentioned. In order to make this part of the apparatus as sensitive as possible, the spring T should be as long as possible. It is supported by the block A.

To the sides and top of the box, fix six binding posts, in the positions shown. Connect the upper terminal of the coil to the right hand top binding post. Connect the other terminal of the coil to the spring S. Connect spring R to the binding post on the right hand side. Connect the spring T to the upper binding post on the left hand side. Solder a very small flexible wire to the end of the hook H after the latter is in place. Connect this wire to the left hand binding post on the top of the box. Connect the lower binding post on the left hand side to the small brass screw just below it, and this part of our apparatus will be complete. The cover of the box may be screwed on, and we will be ready next to set up the various parts of our telephone.

Editor Popular Mechanics:—I have constructed the Wireless Telegraph described in May 31 issue. I used nickel filings instead of antimony, as they gave me better results. The only trouble I experienced was the ground connection. The instrument worked all right if I used a wire instead of the ground, but failed to work when I used a ground connection. I put the instrument about 50 feet away from the induction coil, which gave about 1-32 inch spark with four Leclanche cells. I connected the instrument as shown in cut to a ground, which was a copper plate about 5 inches x 5 inches, and ran a wire up in the air about 12 feet. At the other end I connected the terminals of the induction coil to a smaller ground and air connection. Was trouble due to a bad ground or to a small spark? Please give a sketch of both station connections. Will you also show in a future issue the construction of a condenser for an induction coil.—J. H. B.

REPLY BY J. J. REZAB.

The ground connections are not so very important in small distances, and I think the size of the spark is the trouble, for an induction coil capable of giving ¼ inch spark but reduced to 1-32 inch goes farther than a coil capable of giving only 1-32 inch spark. But in order to see whether your ground connection is perfect, connect the instrument temporarily to some gas or water pipes. Also try by reversing the direction of the current in the primary of the coil.

Prof. J. B. Johnson, dean of the Engineering School of the Wisconsin State University, was killed on June 23 by falling from a wagon and the wheels passing over his head.

THE QUEEREST VESSELS AFLOAT.

Sailing on a Japanese Junk with merry Japanese girls laughing and singing all about is among the rarest kinds of sport. The rude craft glides along crystal waters past flowery shores and quaint villages. The sails may be of silk of different color or of matting. The Japanese Junk is superior to that used in China where it is more universally employed, however, and is known as the largest Chinese vessel.

The Junks are also used by the Malays and Siamese. They are of different construction among the different nationalities but all bear close resemblance to each other and are the quaintest looking vessels afloat. The most common type is without keel or prominent stem and with huge masts in one piece. The Chinese Junk has a high forecastle and poop and ordinarily three masts. They are considered incapable of much seamanship or speed, but they have proved themselves seaworthy on voyages extending even to America. The bow on deck is square and the anchors are on each side of the bow. The rudder is suspended and at sea is lowered beneath the depth of the bottom of the vessel. The immense masts are supported by shrouds. Junks are of from 100 to 150 tons burden.

GOLD FIELDS OF ODD FORMATION.

The formation in the gold fields of South Africa are peculiar. The gold is in reefs. These reefs are massive and made up of coarse granite conglomerate and sandstone, with here and there large or small cement seams. The gold is not in the quartz or sandstone, but in the cement. The streaks which carry the gold, says the Mining and Scientific Press, are from 6 inches to 60 feet in width, and almost invariably widen with depth. When the outcropping is first discovered it looks like a vertical vein, but soon flattens out on depth. The mining there is more like coal than gold mining anywhere else. Shafts are nearly all 16 x 8 or 16 x 6.

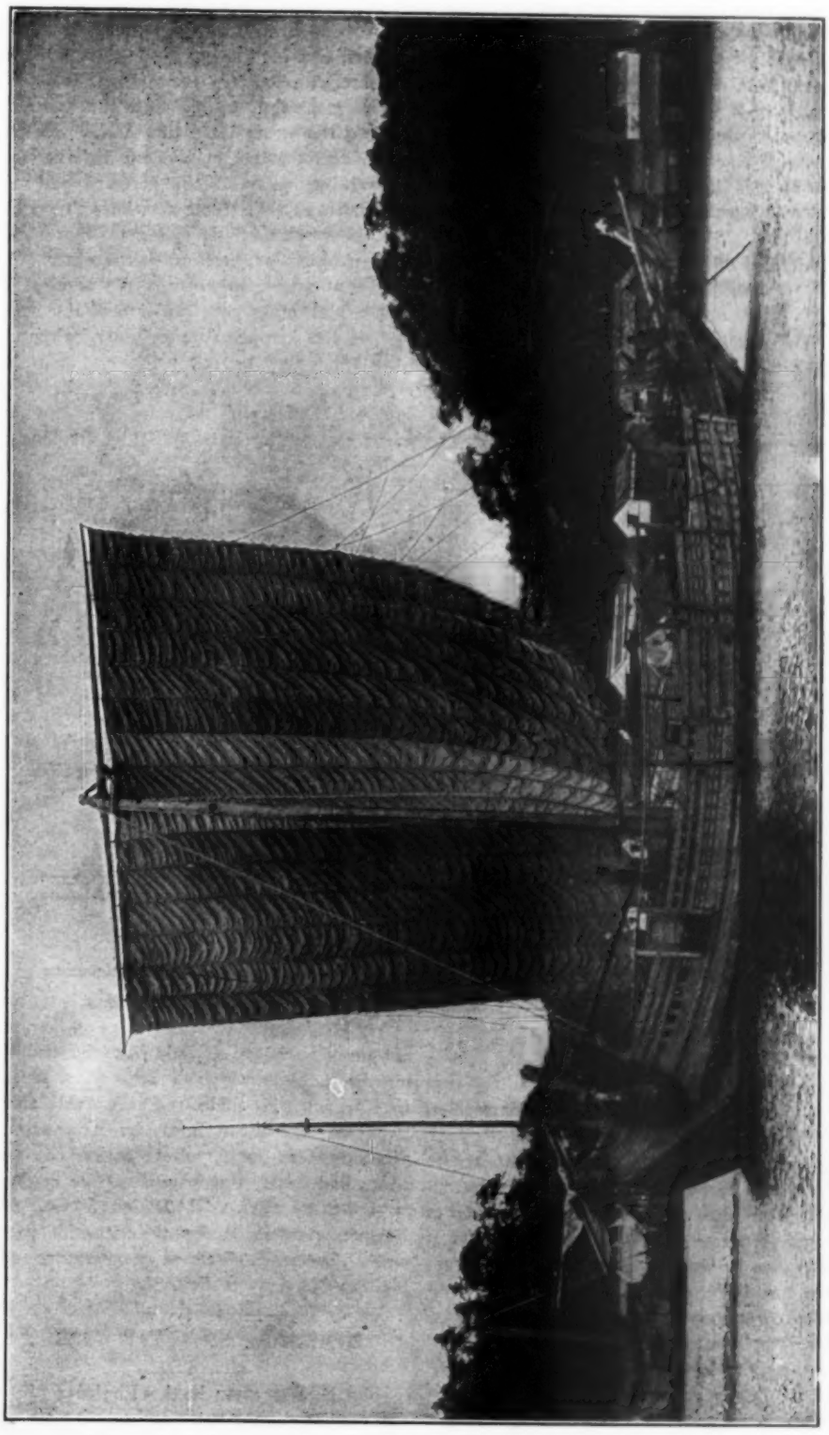
BIG ELECTRIC PLANT FOR WALES.

Waste Coal at the Mines to Furnish 70,000 H. P.—Current at 12,000 Volts.

The South of Wales will have one of the largest electric plants in the world. It will be built at the mouth of the immense coal mines and specially constructed boilers will burn the waste coal which has been gathering on the dump for 50 years. There will be 70,000 horse power in the plant and the smallest engine will be of 3,000 horse power. Water tube boilers such as are used in the French navy will be installed, and carry 200 pounds steam. The fuel will be taken from the pile and placed under the boilers by machinery. Instead of tall stacks forced draft will be used. The engines are condensing and run at 160 revolutions per minute.

The current will be three-phase sent out at 12,000 volts and extend for many miles around in all directions. The cable contains three copper cores, each composed of strands of purest soft copper and covered with paper soaked in bitumen oil. The cable is inclosed in a lead pipe wound with steel wires, and laid in two sets of vitrified pipes, one within the other.

The power house will be 700 feet long. 27 feet wide and 55 feet high.



Japanese Junk—Courtesy Four Track News.

This, it is said, will be the last season of the famous Ferris wheel, one of the wonders of the wonders of the Chicago World's fair. The wheel is to be removed to New York.

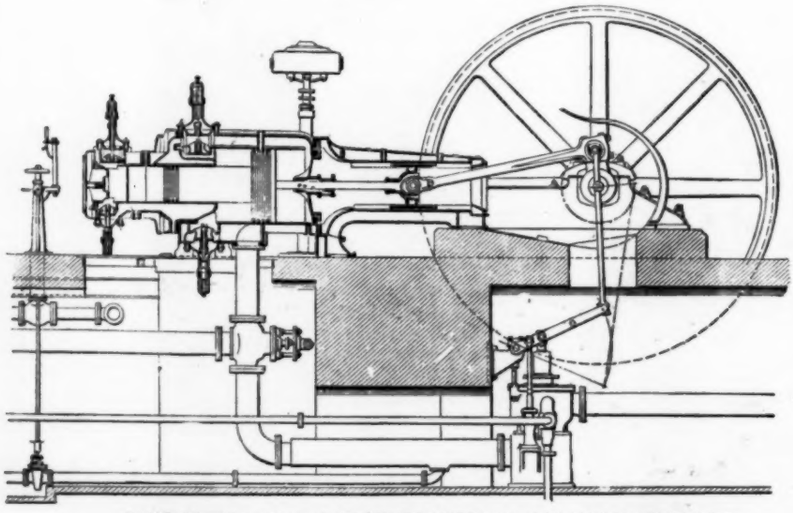
SHOP NOTES

NEW SOLDER FOR ALUMINUM.

Hjalmar Lange, a Danish inventor, has taken out a patent in Denmark for a process of soldering aluminum which consists of first coating the aluminum surfaces to be soldered with a layer of zinc. On top of the zinc is melted a layer of an alloy of one part aluminum to two and one-half parts of zinc. The surfaces are placed together and heated until the alloy between them is liquefied.—Lead and Zinc News.

TANDEM-COMPOUND ENGINE USING SUPERHEATED STEAM.

The engine is a tandem-compound, with poppet valves operated as usual from a cam-shaft lying parallel with the cylinders and driven by bevel gears from the crank shaft, says the American Electrician. The rear, or high-pressure cylinder, is single-acting; steam acts only on the rear piston face. The piston is therefore constructed as a plunger piston in the high-pressure cylinder, and has an enlargement at its front end to form the low-pressure piston. The rear face of this latter piston takes steam from the receiver and exhausts it into the condenser in the usual manner; but the front end is under receiver pressure throughout the stroke, and is therefore not provided with any valves. The number of valves required with this construction is consequently only one-half those usually required; moreover, but one stuffing-box is necessary, and that one, being in the forward low-pressure cylinder head, is not exposed to the action of the high-pressure steam. All troubles incident to the maintenance of stuffing-boxes in high-pressure superheated steam are thereby avoided. The cut shows the construction of the engine. It will be noticed that there is but one set of valves for the high-pressure cylinder, and one set for the low-pressure cylinder. The admission valve in each case is on top, and the exhaust valve at the bottom of the cylinder. A closer inspection shows that the passage leading the steam from the receiver to the low-pressure cylinder connects without any intervening valve to the forward end of the latter, so that steam acts here throughout the stroke. This end acts, therefore, in a manner, as part of the receiver. A dead-beat governor controls the admission to the high-pressure cylinder, and the rear end of the low-pressure cylinder exhausts to a condenser located below the engine. A by-pass to the atmosphere is provided in the exhaust pipe, to permit the engine to be run non-condensing. The condenser air-pump is driven directly from the crank-pin by a pitman, which acts on a lever that works the pump rod. As will also be noted, the same lever drives a small auxiliary feed-pump, whose action can be controlled by a valved by-pass. The engine is built by Breitfeld, Danek & Co., of Prague, Austria, under the Schmidt patents Steam is used at temperature as high as 650 degrees Fah.



CROSS-SECTION OF THE BREITFELD-DANEK TANDEM COMPOUND ENGINE.

STRENGTH OF STEAM PIPE.

John B. Berryman in the Engineer gives the results of a large number of tests at the Crane Co., as follows:

Ordinary commercial pipe, 12-inch and smaller, appears to have an ultimate bursting strength in excess of 1,500 pounds per square inch, provided the weld is perfect. We have tested some lengths of 10-inch pipe taken at random out of stock to 2,300 pounds per square inch; 8-inch, 2,000 pounds; 12-inch, 1,500 pounds; 16⅜-inch thick, 800 pounds; 24⅜-inch thick, 600 pounds, all without rupture or apparent distortion. We have tested from time to time thousands of pieces of all sizes, 20-inch and smaller, under 800 pounds per square inch, so that as far as strength is concerned, there appears to be no reason why pipe heavier than standard should be used on power plant work. In plants where the feed water is bad, it is economy to run the feed lines of extra strong pipe, and this has become quite a common practice even where the water is comparatively good.

TEMPERING ROCK DRILLS WITH COAL OIL.

With oil the amateur may temper steel to stand like the work of an expert. This is principally because, when using oil, a slight variation in temperature does not effect such a change in the final condition of the steel as occurs when water is used. Benjamin Hastings of Chloride, Ariz., says that his experience with common crude oil for tempering drills was such as to warrant its more extended use. In the Mining and Scientific Press he states:

"It is a very rare thing for an oil-tempered drill to break and it wears much better than a water-tempered one. The most serviceable slack tub I found to be a common five-gallon oil can, with the top left as a flap or cover to thrown down and smother the flame in case the oil ignites from the hot steel. If the vessel is left open, the ignition, if it does occur, is of little consequence, like that of coal tar; but with a partially closed tub or tank can, the accumulated gases are liable to produce 'fireworks,' as the writer can testify. There is really no necessity for such inconvenience, however, as the proper heat for plunging the steel—a bright red—is a little below the point necessary to flash the oil. I do not use more than five inches of oil in the bottom of the can. The better the oil becomes the better are the results. The consumption of oil is small, principally due to that portion sticking to the drills on withdrawal. Plunging them in loose dirt, afterward, will clean them.

ORIGIN OF THE LATHE.

The first lathe is still at work. Wood-turners in some of the Asiatic countries go into the deep forests with axes, and with a few rude turning tools and hair ropes build their lathes and turn out objects of beauty and grace, says the Wood Worker. Two trees are selected which stand the proper distance apart near a springy sapling. With his ax the turner cuts out his centers and drives them opposite each other into the trees, which serve

as standards. From one tree to the other he places a stick of wood for a tool rest. With his ax he trims the branches from the sapling, fastens his hair rope to the little tree, gives the rope a turn around one end of the block of wood he desires to turn into shape, and fastens the free end of the rope to a stick which he uses as a foot treadle. When he presses down on the treadle the wood he is turning revolves, and the spring of the sapling lifts the treadle so that it can be used again. This form of a lathe was used in the beginning of industrial history. Some ingenious man improved on it by making a frame to hold the center, and fastened to it an elastic lath or pole to take the place of the sapling. Then came the wheel, and the process of evolution finally arrived at the form of lathe which was like the ordinary foot-power turning table. In Africa is a tribe which is famed for its wood-turning, and the workmen use what is known as the pole lathe. In making a bowl, for instance, a block of wood is held between two poles, which act as an arbor and revolve on centers fastened in standards in a frame. An elastic stick, to which the cord is attached, is coiled around the pole; the other end of the cord is fastened to the wall, and the turner rotates the bowl by pressing down on the cord with his foot.

FURNACE ARCH BARS.

Unless properly set the brick settings for horizontal tubular boilers are apt to crack with the heating and cooling. Special difculties occur in the arch over the back connection where the setting closes up against the back head of the boiler; all the other walls are practically straight, but this wall must be an arch. Although the arch form gives great strength in this connection it requires other support than itself. A writer in The Locomotive says: The rear arch in a boiler setting is often turned from the back wall forward toward the boiler instead of being sprung from one side of the setting to the other, the extra support being obtained, in this case, by passing horizontal fore and aft tie rods through the arch, so as to prevent it from falling forward against the boiler head. This construction often works very well, but we do not consider that an arch that is sprung from the rear wall forward is as good as one that is sprung from one side of the setting to the other, provided proper support is furnished for the latter.

When an arch is thrown from one side of the setting to the other, it is customary to support it by cast-iron bars. This is a correct idea, but it is not at all uncommon to see these cast-iron supporting bars disposed below the fire-brick of the arch in such a way as to be exposed to the full heat of the furnace gases. Under these circumstances the bars are almost sure to warp sooner or later and become useless.

The ideal way to arrange a rear arch in a boiler setting is to spring it from side to side, and support it by a cast-iron arch bar that is so designed that no considerable part of the metal is exposed to the direct heat of the furnaces gases. A form of bar that accomplishes this end satisfactorily is shown in the accompanying illustrations. Fig. 2 shows the size and shape of the bar that is used with the standard setting of the Hartford Steam Boiler Inspection and Insurance Company for 72-inch boilers. It consists of a curved piece one inch thick, cast to a radius of 8 feet, and provided at the back with a rib which is 4 inches deep at the middle, and tapers down to nothing at the ends. The brick are laid up against the bar in an arch, as shown, and they are held in position at either end

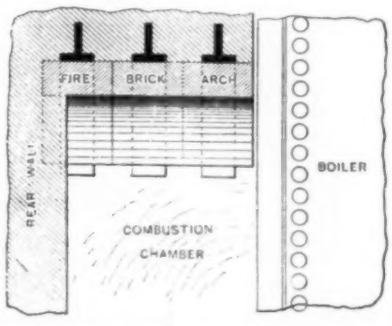


FIG. 1. FURNACE ARCH BARS.

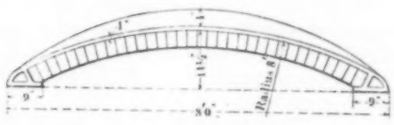


FIG. 2. FURNACE ARCH BARS.

FIG. 3. FURNACE ARCH BARS.

by projections cast upon the bar. A top view of the arrangement is given in Fig. 3, where it will be seen that the bar that supports the brick is only 4 inches wide, so that the brick project beyond it to a distance of 2½ inches on either side.

In Fig. 1 we have shown the arches in position. Three of them, arranged side by side, are sufficient to cover the space between the boiler and the rear wall in most cases, but more could be used if necessary. The ends of the iron supporting bars rest on the side walls of the furnace, and the rear wall is built up around the arch, as shown.

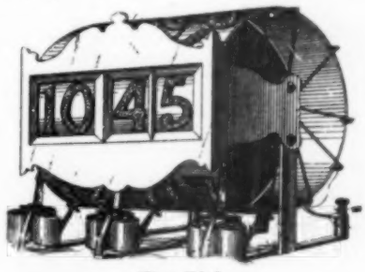
In order that these arch bars may be durable and give satisfaction, the brick that they are to hold and support must be placed in position properly and securely. The arch bar that is to be made ready is first turned bottom upwards, and propped up in a convenient position. The brick that are to go in it are next selected. If "arch brick" curved to an 8-foot radius can be had, they should be used. If not, then common fire-brick must be used instead, but every third or fourth brick will have to be beveled in that case, so that no large spaces will be left between them when they are in position against the bar. The last brick to be put in should be the key brick, in the middle of the arch. This will have to be driven in endwise. No very thin brick should be used in the arch, and if the length of the bar is such as to call for half a brick or so to fill, then several bricks should be each trimmed a little, so that the reduction in thickness should not be very marked in any one of them.

After the brick that are to go in the bar have been carefully selected and fitted so that they will go into position satisfactorily, they should be wetted, coated with a thin paste of fire clay and water, and put in place in the bar. This bar, with the brick in position, should be next turned right side up, and the spaces between the brick well filled with a paste made of fire clay, ground fire brick and water. After the whole has dried and hardened, the arch may be placed in position.

Arch bars made in this way are coming into very general use, and many of the leading boilermakers have patterns from which all ordinary sizes of the bars can be cast.

SECONDARY ELECTRIC CLOCK.

This device comes from New Haven, a great clock town, and is the invention of S. P. Thrasher. Four sets of numerals are placed on a revolving drum, which is turned every five minutes by magnets connected by wires to a master clock. The



The Dial.

drum may contain an electric light for illuminating the figures at night, if desired. The clock occupies only a small space and avoids the confusion of reading the time by hands on a dial.

The seventeen-year locusts, after remaining underground for ten and seven years, are coming forth in overwhelming numbers in various parts of the United States. In one cemetery in Baltimore the superintendent estimated that 10,000,000 had come out of the ground and were at work upon the bushes and trees.

Summer Course in Easy Mechanics For Boys.

By Wilbert S. Drew.

[This series, commenced in issue of June 28, will continue each week. It will give instructions which any boy can understand, how to use carpenter's tools and make things. In doing this only a few tools will be required, and cost of material will be small. The articles to be made will include a boat, table and similar subjects.]

BOX FOR TOILET ARTICLES.

To make this box get a piece of oak ¼ inch thick and large enough to make the following pieces:

Two pieces 10½x7½ inches for top and bottom.

Two pieces 10½x2 inches for sides.

Two pieces 7x2 inches for ends.

Two pieces 10½ inches x ¾ inch for sides of lid.

Two pieces 7 inches x ¾ inch for ends of lid.

One piece 10x2 inches for side of compartment.

One piece 2¾x2 for side of compartment.

Eight pieces 2¼x¾ inches for legs.

These pieces should be cut from the board a little larger all around than their finished dimensions, say ¼ inch wider and ½ inch longer than the sizes given above, using the rip saw when cutting with the grain and the hand saw for cutting across the grain.

Take one of the pieces and plane one edge exactly square and straight. When it will rest on the bottom of the plane so that light cannot be seen at any point between them, test the edge at short intervals throughout its length, with the try-square, and if found square at every point mark it with a double cross, thus XX, and in all other operations on the piece remember that this is the working edge and lay out all dimensions from it. Now take the square and place it against the working edge with the blade extending across the piece ¼ inch from one end and draw a knife line; now measure off the required length from this line and draw a second line in the same way as before. Set a marking gauge to the required width and gauge a line from the face side of the piece, being careful to get a clean, sharp line. This may be done by holding the gauge firmly against the edge of the piece and drawing it along with an even pressure.

Proceed thus with all the pieces, using one setting of the gauge for all pieces that are of the same width.

Saw off the ends of the pieces with the stiff backed saw, just leaving the line on the finished work and plane the remaining side exactly with the gauge line, seeing that the edge is just square in each case.

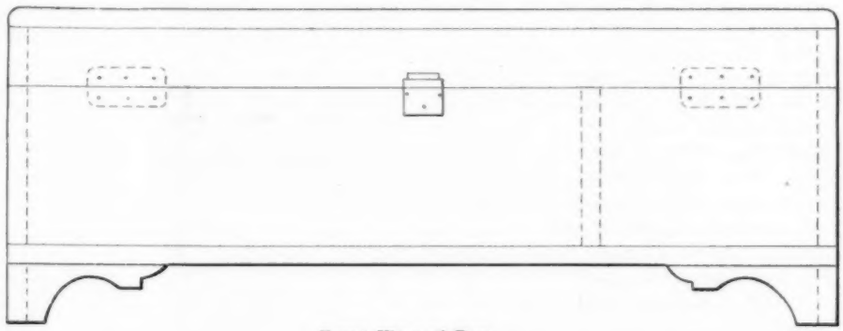
Smooth the ends carefully by taking a very light cut with the plane.

The legs may be sawed to length after planing one edge and cut to the required outline with a sharp pocket knife.

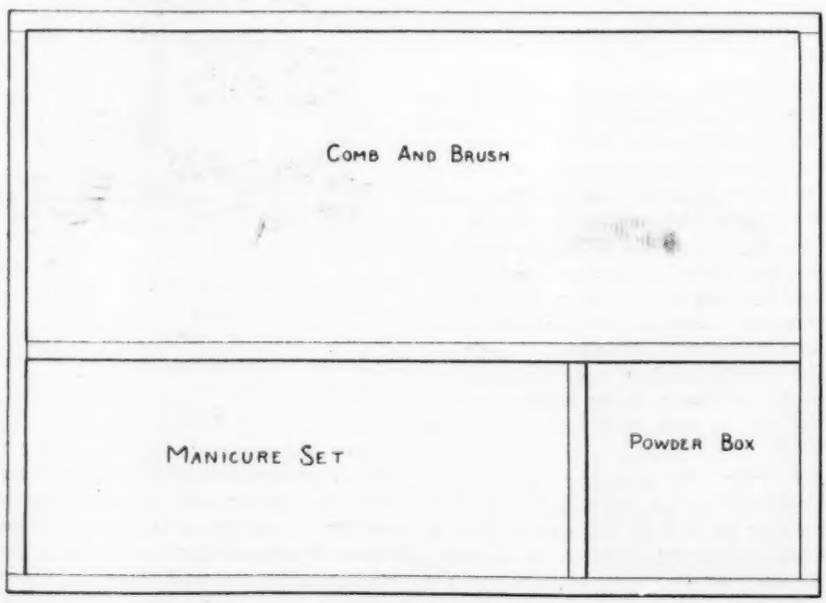
Put together with brads ⅝ inch long. It will be well to make holes for the brads with a small brad-awl, as they are less likely to split the wood or bend up while being driven. The brads should be sunk beneath the surface of the wood with a nail set and then covered with putty, stained the same color as the wood.

A pair of small brass hinges should be placed in the position shown and a catch may be placed in front. These can be held in place by brass escutcheon pins driven through the wood and bent over on the inside.

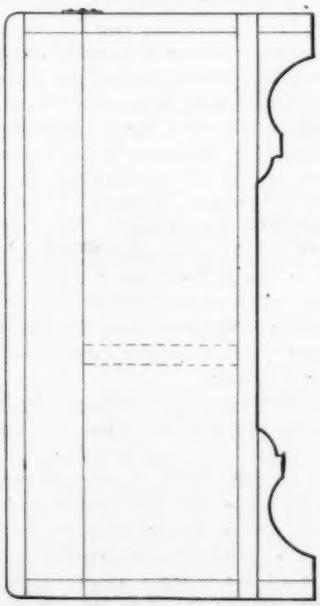
Fill the grain of the wood with two coats of wood filler which may be obtained at any paint store, and then apply two coats of orange shellac with a soft brush and allow it to become thoroughly hard; then rub to a smooth surface with powdered pumice stone and water applied with a soft



Front View of Box.



Plan With Cover Removed



cotton rag. Polish by using a cotton cloth in which is placed about half a teaspoonful of shellac and one small drop of linseed oil on top of this to make it spread. Rub vigorously until dry, when a beautiful polish will appear. If it becomes dull after standing a few days, apply another coat, which will then be permanent. Great care must be used to get as small a quantity of oil as possible, as too much oil deadens the polish and requires a great deal of rubbing to work it all out.

The appearance of the box will be greatly improved if it is lined with quilted satin or with velvet.

A hand mirror may be held in the cover of the box by putting in a wooden button held by a screw, or by using a brass clip to pass over the handle and hold it in place.

(To be continued.)

HAS THINGS TO TALK ABOUT.

A young, and very successful too, traveling man writes us: "I buy your paper from the news stand each week; occasionally I get into a town where none are on sale, and I have to wait a day or two. Then I realize how much help it is to me. I used to be at a loss frequently for something interesting to talk about, and it kept me guessing for something to say, as I don't like to plunge right in and try to sell something the first shot out of the box. 'Popular Mechanics' has fixed me; now I always have something to talk about that everybody seems pleased to hear. You do not know what a help it is."

THE GREAT IRON HILL OF IOWA.

The enormous iron deposits of the famous Iron Hill of Iowa are to be brought in closer touch with the market through the extension of the Waukon branch of the Chicago, Milwaukee & St. Paul railroad, so as to bring the line in direct connection with the plant. Iron Hill is but a short distance from Waukon, the county seat of Allamakee county, and is the highest point in the county. The summit of the ridge is about 200 feet above Village creek, which flows not far from its base. The ore body is reported to contain a maximum thickness of 135 feet, says the Age of Steel. The plant now in operation at the hill has a capacity of 300 tons per ten-hour shift. Analysis of samples shows 67 per cent iron. Pure limonite contains only 59.8 per cent iron while hemalite may reach 70 per cent when pure. The ore in sight is about 300 acres with a maximum thickness of 135 feet. If 70 per cent of the deposits is marketable, as is assumed, the ore would run about 3,000 tons per foot per acre. It is estimated that the entire deposit represents 36,000,000 tons of ore.

TWO HUNDRED GIVE THEIR SKIN TO SAVE BOY.

Foundry Employes Yield a Portion of their Cuticle to Resurface the Body of a Youth.

Otto Bosel, 15 years old, always accommodating and ready with a kind word, was a favorite among all the employes of the L. Wolff Manufacturing Company of Chicago. It was from this reason that when two-thirds (hitherto considered fatal) of his body was burned in the foundry a short time ago, 200 of the men volunteered to bare their arms and submit to a removal of a piece of their skin, 1 by 2 inches in size, as the only means of saving the boy's life. Two hundred pieces of skin are to be used to graft the new skin. The Bosel boy was burned in an explosion of a zinc galvanizing tank. At the hospital his physicians said that he could only live by securing enough new skin to graft on the burned portion of his body, little realizing that such a thing were possible. But the statement of the physician reached the foundry, and there strong men who had known and loved the boy got together and when the facts were told and the discussion concluded, the physician was informed that in the foundry he could get all the skin he wanted to graft on Bosel's body. The operation is now in progress at the Norwegian Lutheran Tabitha Hospital. It will require about four weeks. Dr. R. C. Moore, 16 Alice place, who is in charge, is confident that it will prove successful. One by one the strong men bare their arms and submit to the removal of the patch of skin, which is immediately placed on the burned parts of the boy's body.

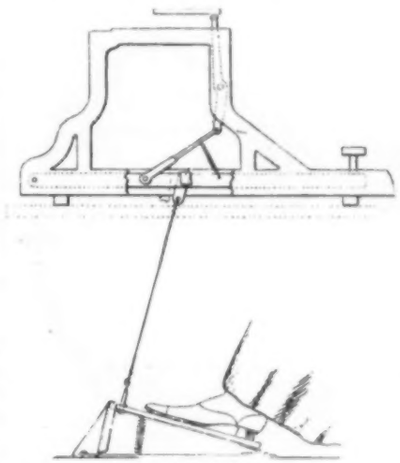
A WONDERFUL POCKET LIFE-SAVER.

A life-saver that can be carried in a person's pocket on shipboard, that will keep any one from sinking and enable most anybody to learn to swim in a few days has been invented by a New Yorker. It weighs less than a half pound and is known as the "Swimming Collar." It is worn around the neck and fits without straps or buckles, leaving the arms free to work. For keepers of bath houses it is a revelation and is sure to spring into universal popularity at bathing beaches and among all swimmers as well as persons learning to swim.

Preserver Inflated.

FOOT TREADLE FOR KEY SHIFTER.

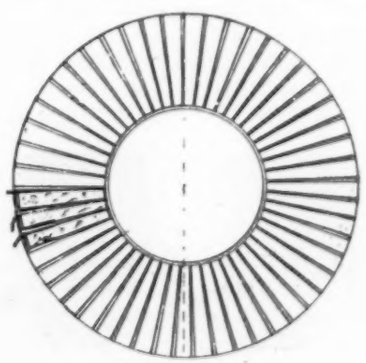
On several of the make of typewriters the capital letters and many other characters are obtained by pressing a key-shifter before the desired letter can be struck. To save time and thus increase speed in writing J. S. Flanders, of Sturgis, Mich., has patented the treadle device shown, by means of which the shifting is done with the foot, leaving both hands free for writing.



Pedal Shifter.

CIGAR VENDING MACHINE.

Vending machines for the sale of gum, nuts and perfumery are well known. A machine for selling cigars has made its appearance on many corners in Chicago. It consists of a disc containing 50 apartments, each containing a cigar, and covered with a glass front. A slot is provided for depositing the coin, upon doing which the disc revolves, bringing one compartment into an open position where the cigar can be taken out.

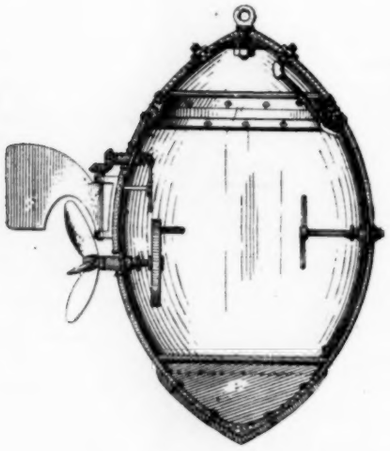


Cigar Vender.

A $3,000,000 glucose factory will be built at Syracuse, N. Y., the plant to occupy 35 acres of land.

VESSEL TO EXPLORE THE SEA.

The old idea of the diving bell has been worked out in a greatly improved form in the invention of Thos. H. Hazard of Vancouver, B. C. He has designed an egg-shaped vessel, made in two parts, the upper piece being removable to permit the occupant to enter. The lower end is heavily

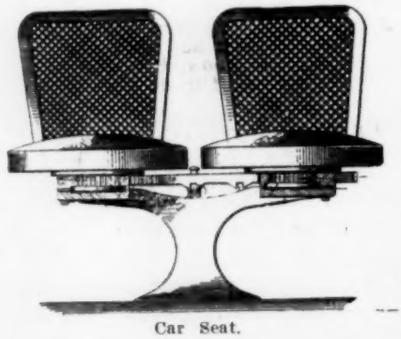


New Diving Machine.

weighted to make the vessel sink. A ring in the upper end is securely fastened to a rope to lower and raise the diver. Air is supplied from air through a hose same as in a diver's helmet. A propeller wheel worked by hand, and a rudder for steering, afford means of moving about when below the surface. The diver cannot, of course, do work as when in diving armor, but there are a great many occasions where exploration and examination are necessary. In such cases the diver can remain down much longer than when dressed in a rubber suit.

INDIVIDUAL CAR SEAT.

This seat is intended to restrict the passenger who tries to fill four seats to only one, and also to provide an easier means



Car Seat.

of sweeping the car. The seats are so connected with gears that, when a spring is pressed and one chair reversed, the other will turn into the same position at the same time.

THE DRIVE WHEEL THAT RAN AWAY.

Some years ago there was great rivalry between the roads running west from Chicago. The ambition of each was to make the run to Denver at the rate of a mile a minute. Figuratively speaking, rails were burned up, bridges destroyed, roadbeds ruined in this mad attempt to hasten the flight of trains between the great lakes and the Rockies.

The A. B. C. road was not behind the others in securing a Denver fast train. Its general passenger agent secured two new coaches, joined to them two or three others that had been revarnished, called it the "Vestibuled Limited Unrivaled" express, and was ready for action. Several new express engines came into the service about this time and No. 1801 of the series was ordered to make the first division run out of Chicago with the Denver train. McFadden was engineer on this 1801 and Forbes fireman. The first time they left Chicago their train carried a score of newspaper men, the general passenger agent and several minor officials.

Before leaving the city the general passenger agent visited the engine and held a whispered conversation with McFadden. He said:

"I want her speeded up a little when you get into the country. Just show how fast we can go and what a fine roadbed we have. Everything is all right and you can use your own judgment as to when to do it."

So when the train was well out of the suburbs he began to give No. 1801 more steam. She answered well to his encouragement. She very easily passed the mile-a-minute point and gained still greater headway. The division superintendent crossed the cab and stood behind McFadden.

"Let 'er go," he shouted in the engineer's ear. "The track is good here and we'll wake the colonel (meaning the passenger agent) up."

McFadden obeyed and the train traveled faster. The country towns seemed to be in motion, not the train, everything was passed with such rapidity. Telegraph operators knew the "Denver" was coming, so did switchmen; and the track was free of obstruction.

In the observation car sat the passenger agent surrounded by the reporters. He was expatiating on the beauties of his road and the way in which its Denver train would eclipse all others.

"Just look at that speed recorder," he said, "and notice although we are running seventy-seven miles an hour there is not a jolt or jar. It is simply the poetry of motion. Observe this."

He rang for the porter of the car and ordered a full glass of water from him. He set the glass on a table, and so even was the train's speed and so smooth the track, the fluid was not spilled.

"I wish I had a photograph of this scene," said the happy official, "just to show what we can do."

A moment later one of the reporters glanced out of a side window of the car and saw a great cloud or ball of dust spin away from the train, rise in the air, leap a ditch, bound over a fence and land far away in a field. He said in a quaky kind of a tone of voice:

"I guess we hit something."

"That's only dust," answered the official. "We've got an engineer on in front there that knows his business. He don't hit things with a train like this."

After that everyone was silent for a few moments. Then came a jolt and a jar, a quick leaping of everyone to his feet and the stoppage of the train.

They found the division superintendent, very white in the face, looking at something under the engineer's side of the cab. McFadden stood by pulling at his pipe. Forbes was on the engine whistling.

"Well," said the division officer, as the others came up, "I congratulate you that we are all here instead of in the ditch or worse."

"We saw a cloud of dust go into a field back there," exclaimed a writer.

"Wasn't much dust in it," observed the superintendent. "That was one of the drivers of this engine—burned herself right off, and, instead of going under, bounded off and left us on the track. Why it didn't go under I don't know, but here we are with three drivers and safe."

* * *

An examination of the train and the track showed what a strange course the driver had taken after leaving the engine. It first dropped to the ties, battering their ends, but running along parallel with the train. In dropping back from the engine it struck the corner of the dining car and made a great dent in it; then it swung off into the ditch, and, still moving with great rapidity, leaped into the air and into a field. It was found fifty feet away from the track.

Without much difficulty McFadden was able to bring the train into the nearest station, and there a new engine was secured. After that, to show what they could do, McFadden and Forbes brought 1801 back to Chicago on three drivers.

"How fast were you running when that driver dropped?" asked the master mechanic.

"About eighty-two miles an hour," said McFadden.

But the general passenger agent, who had promoted the fast ride, never expatiated on this phase of it, and his Denver train lasted just about long enough to take it off.—Railroad Trainmen's Journal.

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THE TUNNEL.

Gray, rock-strewn plains, walled in with hueless hills;
A blurred, tumultuous canyon; then the black
Jaws of the tunnel—instant night, that chills
Through the closed windows. Down the obscure track
Rushes the train with blind, monotonous
Clamor; the steam's huge intermittent roar
Grows fiercer. Has this darkness dolorous
No end?—and shall we see the sky no more?

But look! A sudden smoky dawn—a burst
Of sunshine, and the far, sweet blue! Behold
Another country fairer than the first:
Meadows and misty woods and harvest-gold,
And a slow river, at whose flowered verge
The wet grass flourishes and calm trees bend.
And so, perhaps, we may at last emerge
From that dread tunnel whither all roads tend.

—June Lippincott.

HE REMEMBERED IT ALL RIGHT.

"John!" she said, looking at him severely, "did you know that yesterday was the anniversary of our wedding?"

"Certainly, my darling, certainly," he replied, pretending that he wasn't at all surprised. "Didn't they send that little thing out from the jeweler's that I ordered for you? I shall go around today and see about it. Confound those people, anyway. They promised they'd send it yestreday without fail. If there's anything that makes me mad it's to have people lie to me about a thing of that kind. I'd have gone somewhere else if they had said they couldn't have it ready in time. Well, I'll make such a kick when I get in town today that they won't forget next time, I'll bet. Yes, I remembered it, my dear. I thought of you all day, and of that other happy day. What a glorious—why, my darling, what are you crying for?"

"Oh, you l-l-liar!" she sobbed. "It isn't till next month, and you're d-d-deceiving me! Go away! Don't you dare to t-t-touch me!"

"Confound women anyhow," he said, as he went down the front steps. "They're never happy unless they're making trouble for themselves!"—Chicago Record Herald.

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Attractions for Next Week.

"Westward the Star of Empire Takes its Flight." Isn't it strange how all nations begin at the East and grow West. Keep your eye on Oregon. There is a young giantess of the West that will soon spring into great prominence because of her wonderful natural resources and superb location. We intended to tell about Oregon in this issue but our corps of writers and artists who have the article in preparation were unable to get their work completed in time. It will appear without fail, however, next week.

Did you know that there is as much difference in the flavor of eggs as there is in the flavor of butter? If you do not you ought to read Popular Mechanics next week. As the quality of butter and milk depends on the kind of food the cow eats so the quality of egg depends on the kind of food the chicken eats. There is a man in the East who furnishes eggs to all the high class restaurants. He sells them at from 47 to 60 cents a dozen because of their superior quality.

A Chicago scientist has discovered that there is danger of catching disease from the promiscuous shaking of hands; a process has been discovered by which the finest Sumatra tobacco may be raised in this country; the technical school is to be the school of the future; do not throw away corks now, they have value; read about all of these things and ten times as many more in next week's Popular Mechanics. It tells about things that are interesting and "is written so you can understand it."

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